COUNTY OF SAN DIEGO
DEPARTMENT OF PUBLIC WORKS

CIVIL 3D CAD DESIGN STANDARDS

OCTOBER
2010

CoSD DPW CAD Design Standards

This document defines the current CAD Standards for DPW design and construction drawing files and plan sheets. Because the styles for AutoCAD Civil 3D are constantly evolving, so are these CAD Standards. For the current version of these Standards or for any questions regarding these standards, contact:

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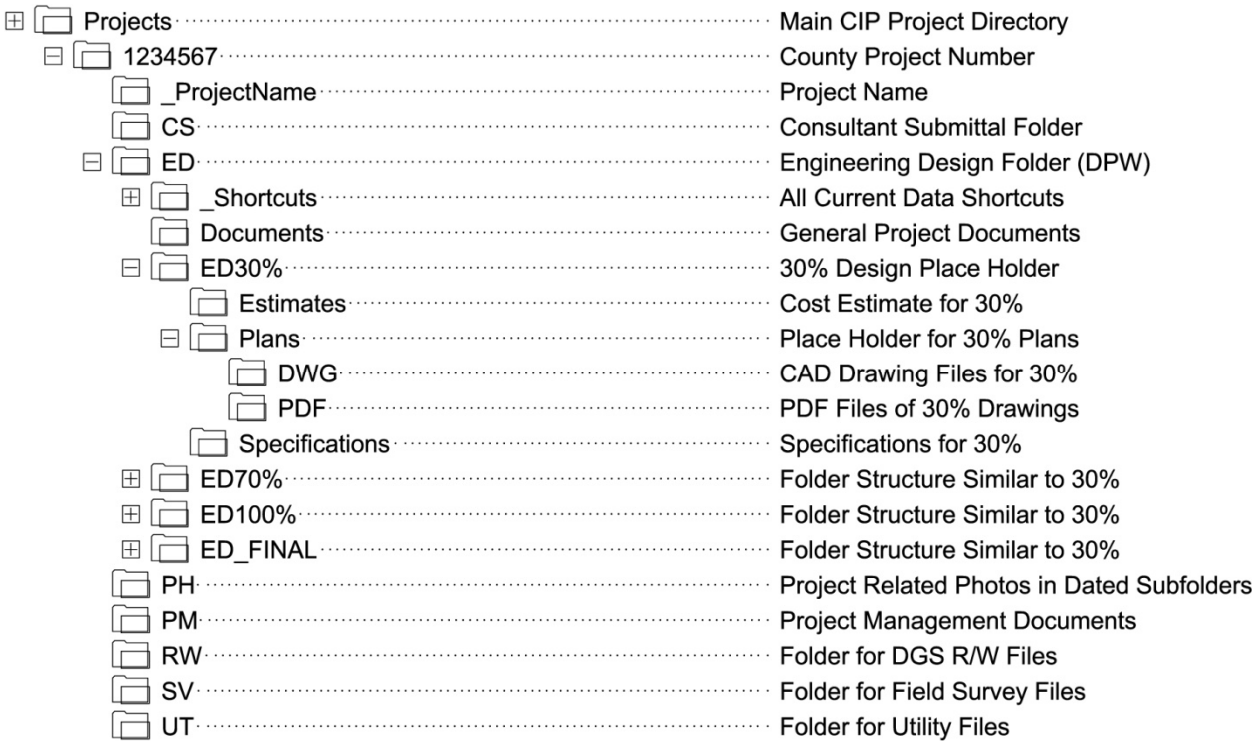
Engineering Design Submittals

All plans submitted to the County of San Diego for review and approval shall be in AutoCAD Civil 3D version 2010. The CAD files shall meet all CoSD DPW CAD Standards and the drawing format shall conform to the CoSD Plan Preparation Guidelines.

CAD Files shall include all data generated by AutoCAD Civil 3D including point files, horizontal and vertical alignment data, profile data, road templates, assemblies with all subassemblies, digital terrain models (dtm) and all files necessary to thoroughly review all design elements.

For specific submittal requirements, refer to the project Scope of Services document.

Project Directory Structure



DPW Field Surveys will provide at least two CAD files in the SV section of the project folder.

1) The Original Ground Topographic Survey Map with Surface. This file will be named with a Survey tracking number such as 2010-0001-EXTO-2. The Design Engineer shall copy this file to the ED folder and rename it to 1234567-EXTO (where 1234567 is the CIP project number). This file becomes the project master topo file. It is the Designer's responsibility to ensure that the master file reflects the current file provided by Field Surveys. This 1234567-EXTO file should be xrefed into the construction files as required.

2) The Legal Road Centerline. This file will also be located in the SV folder and named with a Survey tracking number such as 2010-0001-EXCL. This file shall be copied to the ED folder and renamed to 1234567-EXCL (where 1234567 is the CIP project number) to create the project master centerline file. It is the Designer's responsibility to ensure that the master file reflects the current file provided by Field Surveys. This centerline alignment may consist of one or more road survey alignments attached together to form one continuous alignment stationed from the start of the project to the end. All design work and station references shall be with respect to the master centerline file 1234567-EXCL provided by DPW Field Surveys.

File Types and File Naming

Civil design projects consist of multiple drawing files that require file naming management. All of the engineering drawing files for each phase of the project are to reside in the same folder, including all xref files. Most of the drawing files can be classified as one of the three types listed below.

Construction Files are the files that are plotted as part of the construction plan sheets. Each construction plan is a compilation of master files, including title block (TB). The Construction plan sheets are essentially a window through which the master file details are displayed. Construction files are named by the project number followed by sequential sheet number followed by the sheet title (ex 1234567-C001-Title Sheet, 1234567-C002-General Notes & References, etc). The standard construction file naming convention is as follows: The (7) digit project number, a hyphen followed by a discipline alpha character, the (3) numbers indicating the sheet number, a hyphen and the sheet title. For example, if the project number were 1234567, the first two civil construction sheets would be named as follows:

1234567–C001–Title Sheet	Sheet 1 in the set
1234567–C002–General Notes and References	Sheet 2 in the same project set

Template/Sample files xxxxxxx-C001-Title Sheet.dwg, xxxxxxx-C002-General Notes and References.dwg, and xxxxxxx-C-TB.dwg are provided in the deliverables package and form the basic setup for a project sheet set, please follow the steps below.

Save all files in a directory named for the project number.
Rename the C–TB sheet to include a one letter designation for your specific discipline. ie: Structural S-TB, Electrical E-TB, Landscaping L-TB, Mechanical M-TB, Utilities U-TB.
Rename the other two sheets with the same single letter designation used in step 2.
ie: Structural = 1234567-S001-(title).dwg, 1234567-S002-(title).dwg
Replace the (7) x's with the project number as described above.

Open sheets -x001 and -x002 and re-attach the renamed –TB sheet making certain there is no path used. For additional sheets required, open sheet –x002 and make a saveas copy. This ensures that the correct title block and attribute information is included.

Master Files are the files of the elements or features that go into the design. Examples of master files include the topo (EXTO) and road centerline (EXCL) and proposed planimetric design with geometric alignments (PRPN). Master files are named with the project number (ex 1234567-EXTO, 1234567-EXCL, 1234567-PRPN, etc). Master files of existing features are preceded by "EX" (e.g. EXTO, EXCL, EXRW) whereas master files for proposed features are preceded by "PR" (e.g. PRPN, etc). The following are standard master file names and descriptions. Once a project is started the master files shall not be renamed. In the following example, the project number is 1234567.

1234567-EXRW	Exist. Right of Way	1234567-PROF	Profiles
1234567-EXCL	Exist. Survey Centerline	1234567-SECT	Sections
1234567-EXTO	Existing topographical map	1234567-CORR	Corridors
1234567-EXUT	Existing utility	1234567-SURF	Surfaces
1234567-PRPN	Proposed Planimetric		

Master files represent multiple features that are referenced to an established or assumed coordinate system. Do not use any commands that will alter the origin of the design model.

DPW – Field Surveys will provide the EXTO and EXCL files
DGS – Engineering will provide the EXRW file(s)

The CAD Manager will extract the surface(s) and alignment(s) from the files provided by the survey department, merge them into the initial PRPN master file and place it in the appropriate working folder. The designer will prepare the EXUT file from plans provided by the various utility companies. All project CAD files shall be prepared in accordance with the California coordinate system provided by (or approved by) the county surveyor. Each utility is to be on a unique layer. If the same utility is supplied by multiple owners, the layer names are to reflect the owners' names.

Working Files all other files are working files and have no particular naming convention. At the completion of the project phase (30, 70,100, etc) all working (and backup) files shall be deleted unless needed for the subsequent phase. Construction Files and Master Files shall be copied to the next phase folder as the starting point for the next phase.

Changing Design Phases – 30% to 70%

After the 30% submittal of the project is completed and work is to begin on the 70% submittal the following applies.

- Place PDF files of all 30% CAD design documents in: 1234567\ED\ED30%\Plans\PDF
- Copy all construction, master and required support CAD files from ED30% to ED70%
- ZIP all 30% CAD files into a single .zip file: 1234567\ED\ED30%\Plans\DWG\1234567-30%.zip

Design Element Naming

Alignments: Alignments shall be named based on the centerline and offset. Where all improvements are within the limits of an existing road survey alignment (most projects) the alignments shall be named based on the RS number. (For example RS2310-L-EP, RS2310-R-TC). Where centerline alignment provided by Field Surveys includes multiple RS numbers, alignments should be named using simply EXCL, for example EXCL-R-EP, EXCL-L-TC, etc)

Note that proposed changes to the centerline will either be a new road survey (example RS2310-1) or simply a construction centerline. Check with Field Surveys to see if a new road survey is justified, and if so utilize the new RS number in alignments (example RS2310-1-R-EP). If the new centerline alignment is simply a construction centerline, then name as PRCL and offsets as PRCL-R-EP etc.) Note that all proposed centerlines must tie into the existing road survey alignment with station equations at each join point.

Alignment Name	Alignment Description
RS12345	Centerline Alignment for Main Street RS 12345
RS12345-L-TC	RS 12345 left top of curb
RS12345-R-HP	RS 12345 right hinge point
RS12345-L-DWY-44+11	Driveway Alignment for RS12345 Left @ Sta. 44+11

Alignment abbreviations:
SC Saw Cut Line
LG Lip of Gutter
FL Flowline
TC Top of Curb
FW Front of Walk
BW Back of Walk
HP Hingepoint

In addition to alignments, section line groups should also follow the ‘RS’ naming convention.

Surfaces: Surface names should provide sufficient information to discern what the surface represents. Avoid abbreviations that others involved in the project may not be able to fully decipher. Include ‘top’ or ‘datum’ at the end of the surface name

Cogo Point Numbering Standard

Point numbers are to be generated using the following guidelines:

Points 1-999	Boundary and Control Points
Points 1000-9999	Staking and As-Built Points
Points 10000-14999	Topography Points
Points 15000 and up	Design

Standard Text Styles

There are (2) standard text styles, CoSD TITLE and CoSD STANDARD. There are also (3) standard text layers: C-ANNO-01, C-ANNO-02 and C-ANNO-03. The list below is a general overview of the use of the standard fonts and layers.

Text Description	Text Style	Plot Height	Layer
General Notes	CoSD STANDARD	0.100	C-ANNO-01
Stationing	CoSD STANDARD	0.100	C-ANNO-01
Station Elevations	CoSD STANDARD	0.100	C-ANNO-01
Cross Section Offsets	CoSD STANDARD	0.100	C-ANNO-01
Cross Section Elev's	CoSD STANDARD	0.100	C-ANNO-01
Standard Headings	CoSD TITLE	0.150	C-ANNO-02
Standard Labels	CoSD TITLE	0.150	C-ANNO-02
Main titles	CoSD TITLE	0.200	C-ANNO-03
Subtitles	CoSD TITLE	0.200	C-ANNO-03
Street Names	CoSD TITLE	0.200	C-ANNO-03

The CoSD STANDARD style is intended for the majority of the general notation on the sheet. The CoSD TITLE style should be used primarily for main headings and titles. The (3) standard annotation layers have increasingly heavier pen weights as listed below.

C-ANNO-01	0.0070
C-ANNO-02	0.0100
C-ANNO-03	0.1400

Layer Standards

The current layer standards in use by DPW reflect the National CAD Standards layering convention. The majority of the layers used are already present in the prototype drawing. If additional layers need to be created, follow the format used in the prototype.

Name	Color	Linetype	Description
0	7	Continuous	
C-ANNO-01	1	Continuous	Annotation: light pen weight
C-ANNO-02	2	Continuous	Annotation: medium pen weight
C-ANNO-03	3	Continuous	Annotation: heavy pen weight
C-ANNO-MTCH	7	DASHED	Annotation: C-ANNO-MTCH
C-ANNO-MTCH-HATCH	7	Continuous	Annotation: C-ANNO-MTCH-HATCH
C-ANNO-MTCH-TEXT	4	Continuous	Annotation: C-ANNO-MTCH-TEXT
C-ANNO-TABL	1	Continuous	Civil: Table
C-ANNO-TABL-PATT	7	Continuous	Civil: Table Hatch
C-ANNO-TABL-TEXT	4	Continuous	Civil: Table Text
C-ANNO-TABL-TITL	4	Continuous	Civil: Table Title
C-ANNO-TABL-TTBL	5	Continuous	Civil: Table Borders
C-ANNO-VFRM	131	Continuous	Annotaton: C-ANNO-VFRM
C-ANNO-VFRM-TEXT	2	Continuous	Annotation: C-ANNO-VFRM-TEXT
C-ESMT-ROAD	23	Continuous	Easements: roadway
C-PROP-BNDY	4	Continuous	Property: boundary
C-PROP-BRNG	3	Continuous	Property: bearing
C-PROP-LINE	230	Continuous	Property: parcel lines
C-PROP-LOTS	6	Continuous	Property: lots
C-PROP-PATT	131	Continuous	Property: parcel hatching
C-PROP-RSRV	94	Continuous	Property: reserved
C-PROP-TEXT	3	Continuous	Property: label
C-ROAD	7	Continuous	Roadways: C-ROAD
C-ROAD-ASSM	40	Continuous	Roadways: assemblies and subassemblies
C-ROAD-ASSM-BLIN	1	Continuous	Roadways: assembly baseline
C-ROAD-ASSM-OFFS	1	Continuous	Roadways: assembly offset
C-ROAD-ASSM-TEXT	7	Continuous	Roadways: assembly text
C-ROAD-BRNG	1	Continuous	Roadways: bearings
C-ROAD-CNTR	4	CENTER2	Roadways: centerline
C-ROAD-CNTR-EXTN	4	CENTER2	Roadways: centerline
C-ROAD-CNTR-EXTN-N	4	CENTER2	Roadways: centerline
C-ROAD-CNTR-N	4	Continuous	Roadways: centerline, NEW
C-ROAD-CORR	5	Continuous	Roadways: corridor
C-ROAD-CORR-BNDY	1	CENTER2	Roadways: corridor boundary
C-ROAD-CORR-PATT	141	Continuous	Roadways: corridor patterns
C-ROAD-CURV	4	Continuous	Roadways: curves

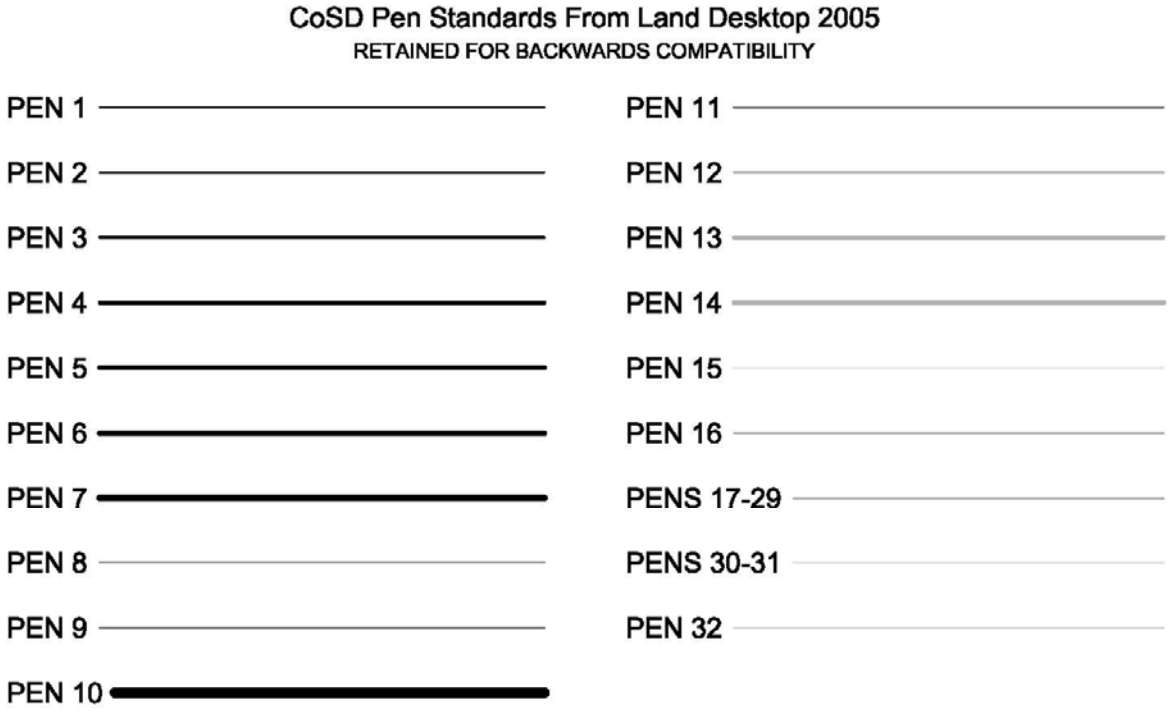
C-ROAD-FEAT	182	Continuous	Roadways: feature line
C-ROAD-LABL	1	Continuous	Roadways: labels
C-ROAD-LABL-N	3	Continuous	Roadways: labels
C-ROAD-LINE	1	Continuous	Roadways: tangent lines
C-ROAD-LINE-EXTN	252	HIDDEN	Roadways: PVI extention lines
C-ROAD-LINK	150	Continuous	Roadways: corridor and section links
C-ROAD-LINK-TEXT	7	Continuous	Roadways: corridor and section link text
C-ROAD-MARK	212	Continuous	Roadways: corridor and section marks
C-ROAD-N	4	Continuous	Roadways: C-ROAD-N
C-ROAD-PROF	1	HIDDEN	Roadways: profiles
C-ROAD-PROF-ASMC	3	Continuous	Roadways: profile assymetrical curves
C-ROAD-PROF-CURV	5	Continuous	Roadways: profile vertical curves
C-ROAD-PROF-DIAG	4	Continuous	Roadways: profile band diagrams
C-ROAD-PROF-GRID	4	Continuous	Roadways: profile grid
C-ROAD-PROF-GRID-GEOM	5	Continuous	Roadways: profile gridline @ geometry points
C-ROAD-PROF-GRID-MAJR	8	Continuous	Roadways: profile gridline @ major stations
C-ROAD-PROF-GRID-MINR	8	Continuous	Roadways: profile gridline @ minor stations
C-ROAD-PROF-LINE	1	Continuous	Roadways: profile vertical lines
C-ROAD-PROF-LINE-EXTN	1	HIDDEN	Roadways: centerline extention
C-ROAD-PROF-LINE-EXTN-N	4	HIDDEN	Roadways: centerline extention
C-ROAD-PROF-LTOF	2	Continuous	Roadways: profile left offset sample lines
C-ROAD-PROF-N	4	Continuous	Roadways: profile new
C-ROAD-PROF-NEW	4	Continuous	Roadways: profile new
C-ROAD-PROF-PARB	7	Continuous	Roadways: profile parabolic curves
C-ROAD-PROF-PNTS	252	HIDDEN	Roadways: profile geometry points
C-ROAD-PROF-RTOF	1	Continuous	Roadways: profile right offset sample lines
C-ROAD-PROF-STAN-GEOM	2	Continuous	Roadways: profile geometry point labels
C-ROAD-PROF-STAN-MAJR	2	Continuous	Roadways: profile major station labels
C-ROAD-PROF-STAN-MINR	2	Continuous	Roadways: profile minor station labels
C-ROAD-PROF-TEXT	2	Continuous	Roadways: profile text
C-ROAD-PROF-TEXT-N	3	Continuous	Roadways: profile text
C-ROAD-PROF-TICK	7	Continuous	Roadways: profile tick marks
C-ROAD-PROF-TITL	2	Continuous	Roadways: profile label
C-ROAD-PROF-TTLB	5	Continuous	Roadways: profile label
C-ROAD-PROF-VIEW	7	Continuous	Roadways: C-ROAD-PROF-VIEW
C-ROAD-SAMP	131	HIDDEN	Roadways: sample lines
C-ROAD-SAMP-TEXT	2	Continuous	Roadways: sample lines text
C-ROAD-SCTN	7	Continuous	Roadways: grade in sections
C-ROAD-SCTN-DIAG	212	Continuous	Roadways: section diagram
C-ROAD-SCTN-GRID	7	Continuous	Roadways: section grid
C-ROAD-SCTN-LABL	3	Continuous	Roadways: section labels
C-ROAD-SCTN-N	4	Continuous	Roadways: section, NEW

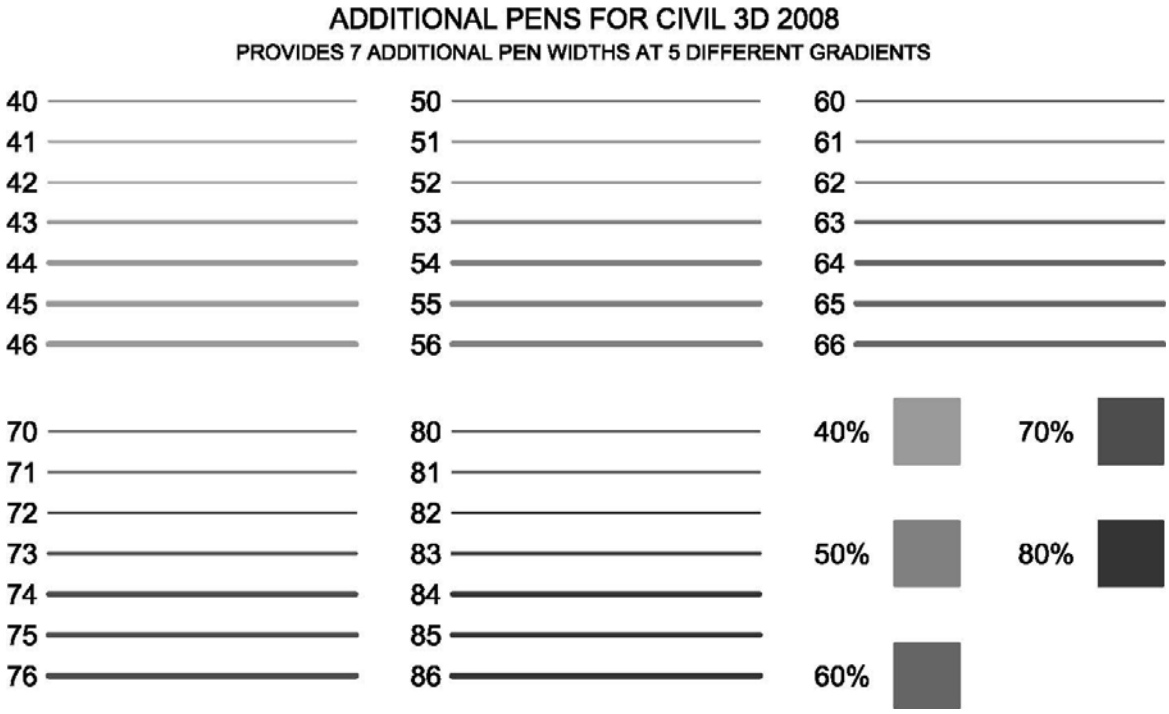
C-ROAD-SCTN-SHET	7	Continuous	Roadways: grade in section sheets
C-ROAD-SCTN-TABL	1	Continuous	Roadways: C-ROAD-SCTN-TABL
C-ROAD-SCTN-TEXT	3	Continuous	Roadways: section text
C-ROAD-SCTN-TICK	7	Continuous	Roadways: section tick marks
C-ROAD-SCTN-TITL	3	Continuous	Roadways: section title
C-ROAD-SCTN-TTLB	5	Continuous	Roadways: section border
C-ROAD-SHAP	32	Continuous	Roadways: corridor and section shapes
C-ROAD-SHAP-PATT	7	Continuous	Roadways: corridor and section shapes hatching
C-ROAD-SPIR	3	Continuous	Roadways: spirals
C-ROAD-STAN	2	Continuous	Roadways: stationing
C-ROAD-STAN-MAJR	2	Continuous	Roadways: major stationing labels
C-ROAD-STAN-MINR	2	Continuous	Roadways: minor stationing labels
C-ROAD-TABL	1	Continuous	Roadways: C-ROAD-TABL
C-ROAD-TEXT	2	Continuous	Roadways: text
C-SSWR-CNTR	200	Continuous	Sanitary Sewer: centerline
C-SSWR-PIPE	200	Continuous	Sanitary Sewer: piping
C-SSWR-PIPE-PATT	7	Continuous	Sanitary Sewer: piping, hatching
C-SSWR-PROF	200	Continuous	Sanitary Sewer: profile
C-SSWR-STRC	200	Continuous	Sanitary Sewer: structures
C-SSWR-STRC-PATT	200	Continuous	Sanitary Sewer: structures, hatching
C-SSWR-TEXT	7	Continuous	Sanitary Sewer: text
C-STRM-CNTR	170	CENTER2	Storm Sewer: centerline
C-STRM-PIPE	170	Continuous	Storm Sewer: piping
C-STRM-PIPE-PATT	7	Continuous	Storm Sewer: piping, hatching
C-STRM-PROF	170	Continuous	Storm Sewer: profile
C-STRM-STRC	170	Continuous	Storm Sewer: structures
C-STRM-STRC-PATT	7	Continuous	Storm Sewer: structures, hatching
C-STRM-TABL	1	Continuous	Storm Sewre: C-STRM-TABL
C-STRM-TEXT	7	Continuous	Storm Sewer: text
C-TINN	182	Continuous	Triangulated irregular network
C-TINN-BNDY	110	Continuous	Triangulated irregular network: boundary
C-TINN-VIEW	252	Continuous	Triangulated irregular network: triangle view
C-TOPO-CONT-TEXT	7	Continuous	Topography: contour labels
C-TOPO-CONT-TEXT-N	1	Continuous	Topography: contours labels, NEW
C-TOPO-FEAT	3	Continuous	Topography: C-TOPO-FEAT
C-TOPO-GRAD	94	Continuous	Topography: grading
C-TOPO-GRAD-CUT	1	Continuous	Topography: grading cut material
C-TOPO-GRAD-FILL	94	Continuous	Topography: grading fill material
C-TOPO-MAJR	9	Continuous	Topography: major gridlines
C-TOPO-MAJR-N	5	Continuous	Topography: major contours, NEW
C-TOPO-MINR	8	Continuous	Topography: minor gridlines
C-TOPO-MINR-N	3	Continuous	Topography: minor contours, NEW

C-TOPO-TEXT	12	Continuous	Topography: text
C-TOPO-USER	40	Continuous	Topography: user contours
C-TOPO-USER-N	4	Continuous	Topography: user contours
C-TOPO-WDRP	141	Continuous	Topography: C-TOPO-WDRP
C-TOPO-WSHD	141	Continuous	Topography: watershed
C-TOPO-WSHD-TEXT	7	Continuous	Topography: watershed text
Defpoints	7	Continuous	
V-BLDG-OTLN	170	Continuous	Survey Buildings: outline
V-CTRL-BMRK	4	Continuous	Survey Control points: benchmark.
V-CTRL-HCPT	4	Continuous	Survey Control points: horizontal.
V-CTRL-LINE-DIRC	6	Continuous	Survey Control points: traverse lines
V-CTRL-LINE-NETW	2	Continuous	Survey Control points: traverse network
V-CTRL-LINE-SHOT	177	Continuous	Survey Control points: traverse sideshot
V-CTRL-NODE-KNOW	3	Continuous	Survey Control points: known points
V-CTRL-NODE-SHOT	2	Continuous	Survey Control points: sideshots
V-CTRL-NODE-UNKN	1	Continuous	Survey Control points: unknown points
V-CTRL-TRAV	4	Continuous	Survey Control points: traverse
V-CTRL-TRAV-ERRO	3	Continuous	Survey Control points: traverse errors
V-CTRL-VCPT	4	Continuous	Survey Conrtol points: vertical.
V-NODE	1	Continuous	Survey Node
V-NODE-BNDY	1	Continuous	Survey Node: baseline
V-NODE-NGAS	2	Continuous	Survey Node: gas line & appurtenances points.
V-NODE-POLE	1	Continuous	Survey Node: pole points (power, telephone, etc.).
V-NODE-SIGN	1	Continuous	Survey Node: sign.
V-NODE-SSWR	3	Continuous	Survey Node: sanitary sewer and appurtenances points.
V-NODE-STRM	3	Continuous	Survey Node: storm sewer and appurtenances points.
V-NODE-TEXT	2	Continuous	Survey Node: text
V-NODE-TREE	62	Continuous	Survey Node: tree points.
V-NODE-WATR	5	Continuous	Survey Node: water line and appurtenances points.
V-ROAD-CNTR	1	CENTER	Survey Road: centerline
V-ROAD-CURB	50	Continuous	Survey Road: curbs
V-SITE-FNCE	131	FENCELINE2	Survey Site: fences
V-SITE-VEGE	80	Continuous	Survey Site: vegetation, trees, shrubs
V-SURV-FIGR	170	Continuous	Survey: V-SURV-FIGR
V-SURV-LABL	122	Continuous	Survey: text
V-SURV-LINE	130	Continuous	Survey: lines
V-SURV-NTWK	4	Continuous	Survey: V-SURV-NTWK

Printing and Plotting

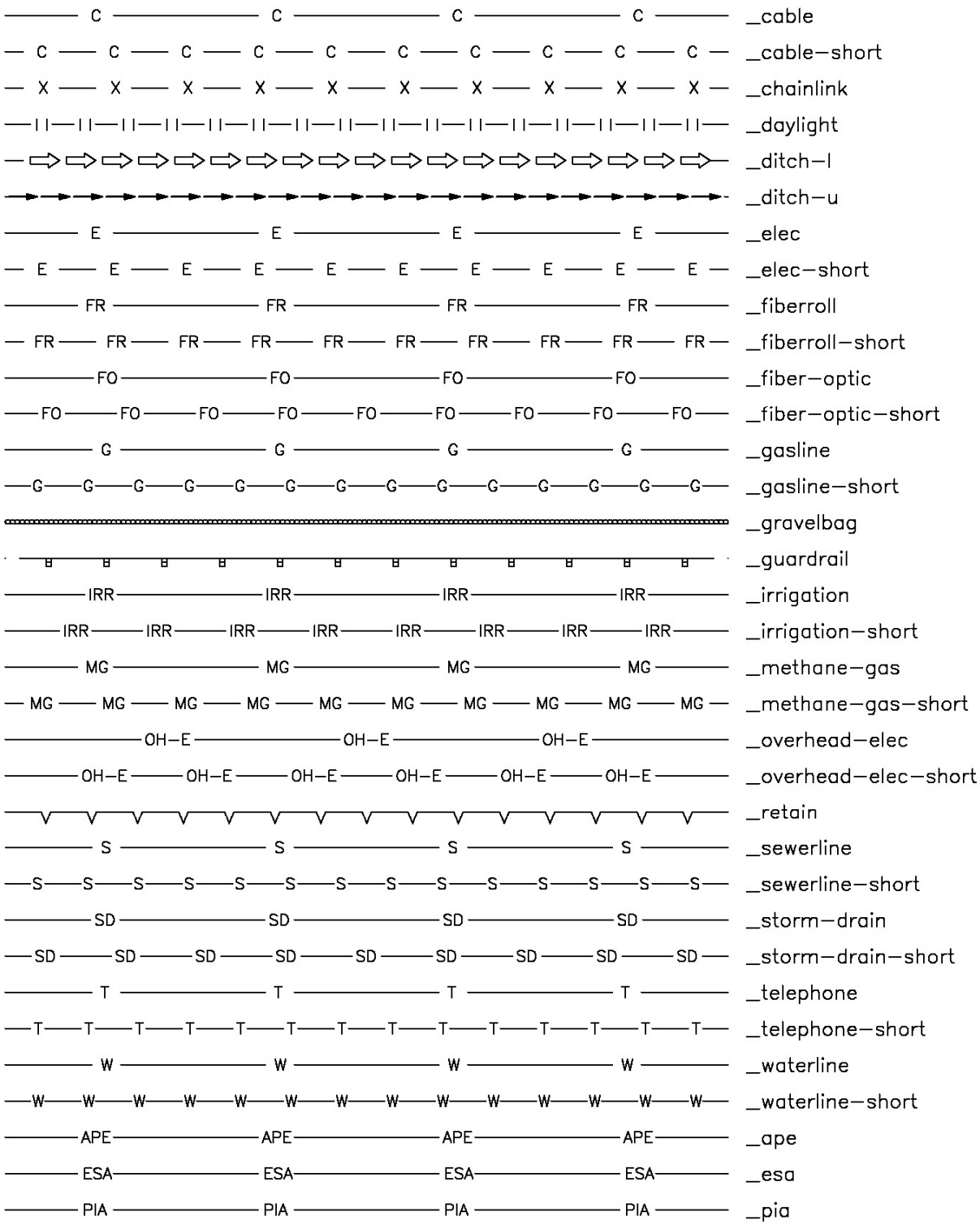
All prints and plots are to be done to scale, 1:1 for full size and 1:2 for half size. The (2) standard plot styles are “DPW” for full size plots and “DPW Half Size” for half size plots. The following page shows the pen assignments and line weights.





DPW Custom Linetypes

The linetypes shown are representative of those included in the support files. Additional custom linetypes may have been added and are not reflected below but are included in the standards and template file.



Directory Structure and Permissions – DPW Use Only